



BCM RIs 6.0

VLANs

Task Based Guide

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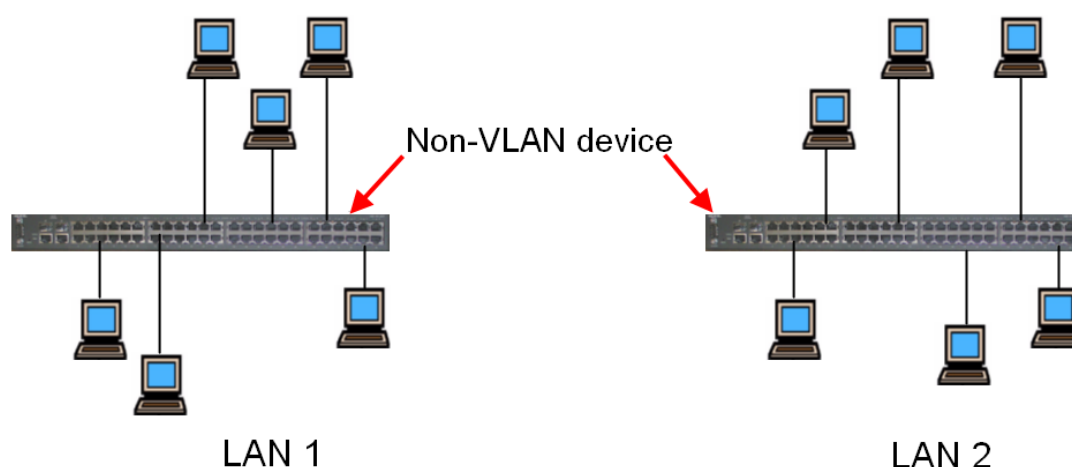
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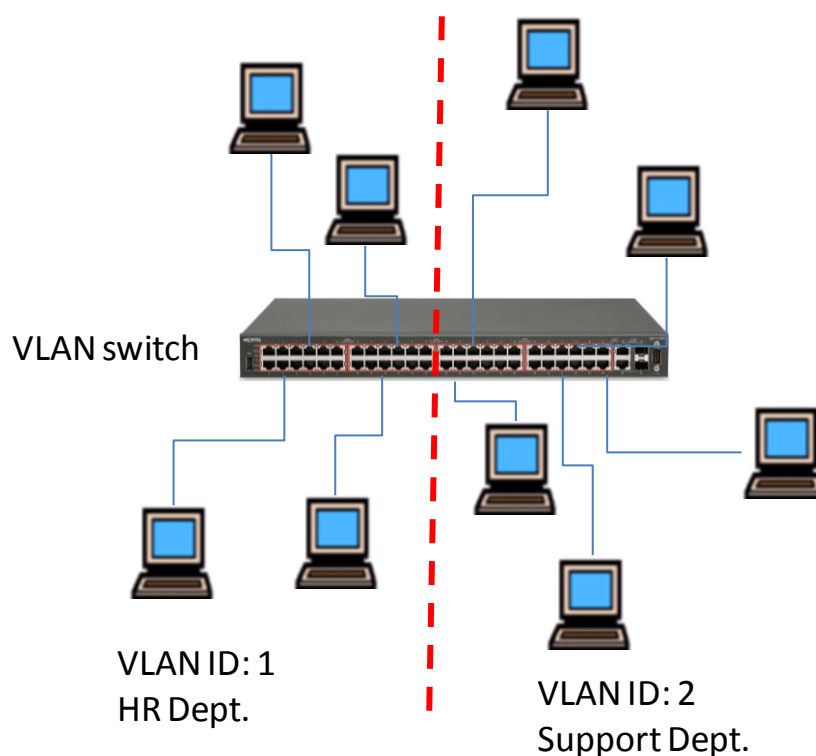
VLANs

Overview

Virtual LANs (VLANs) were designed to enable creation of multiple logical networks using common hardware. If a network administrator wanted to create separate logical networks but did not have a VLAN capable device, they would have to have a separate switch (or groups of switches) for each network they wanted to create, as below:

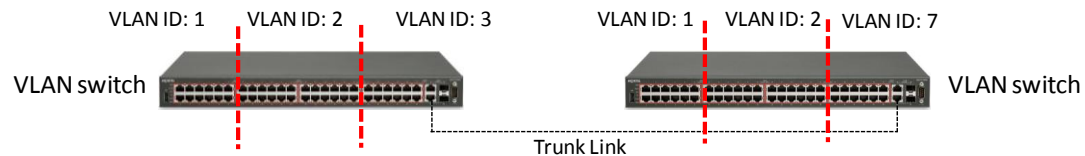


With a VLAN device such as a VLAN capable switch, separate logical networks can be created using common hardware. A simple example is shown below:



This example shows how two logical networks can be kept separate, and in effect, cannot “see” each other.

Another function of VLANs is to create logical networks across geographically dispersed sections within a company, as illustrated below.



The VLAN switches should be capable of VLAN tagging to be able to link VLANs across multiple VLAN switches.

Benefits of VLANs

VLANs have a number of advantages over traditional LANs:

- **Increase in network Performance:** In networks with a high percentage of broadcasts and multicasts, VLAN reduces the possibility of sending the broadcast and multicast packets to unwanted destinations, i.e. broadcasts are kept within each VLAN.
- **Virtual Group Formation:** Virtual workgroups in a VLAN facilitates increased communication between the members of the workgroup and restricts broadcasts and multicasts within a network.
- **Simplified Administration:** VLAN simplifies the task of the addition and modification of users in the network.
- **Security:** Increased security due to computer's/network devices on the different VLAN's not being able to “see” each other. Also, this feature allows a separate VLAN for Management purposes.

BCM VLANs, DHCP, and the Published IP Address

On creating a VLAN on the BCM, corresponding DHCP ranges can also be configured to serve DHCP clients residing on the VLAN. For example, you may wish to create a VLAN specifically for IP Phones. After creating that VLAN, the DHCP configuration area will allow a range of addresses to be configured to issue to those IP Phones residing on that VLAN.

With the creation of VLANs, possibly for the purpose of segregating IP Phone and other network traffic, consideration should be given to the Published IP Address selection. The Published IP Address is the address that VoIP applications (IP Phones, VoIP trunks etc.) and LAN CTE should register

against (refer to the ***IP Telephony Guide*** for more information). The possible options will be:

- The Customer LAN address, or
- Any of the BCM VLAN IP Addresses.

Allow Network Access

This feature allows traffic from one VLAN destined for other networks, or VLANs, to be forwarded. For example, if there is a VLAN created for IP Phones and those IP Phones need to communicate with IP Softphones on PCs residing on a separate VLAN, Allow Network Access can be enabled to facilitate this. Conversely, if the IP Softphones need to communicate with the regular IP Phones, Allow Network Access should be enabled on the VLAN that they reside on.

By default Allow Network Access (ANA) is disabled. This means that all traffic on one VLAN traversing via the BCM to other networks will be discarded.

Note: Allow Network Access acts as a routing facility. Network routers can also route traffic between the VLANs if they are accessible to the VLANs, and are configured to do so.

Note: VLAN routed traffic is processed by the BCM CPU. Consider your planning of VLAN routing so that VLAN routed traffic does not overload the BCM processor, particularly in the case of the BCM50 where the processing capability is not as great as the BCM450. You can check the processor usage via BCM Monitor to ensure that the BCM is not overloaded.

Auto-Discovery for IP Phones

In a scenario where there are a number of VLANs configured in addition to the Customer LAN, each with a DHCP Address Range configured, the Auto-Discovery feature can be used on IP Phones to automatically query which VLAN it should be assigned to.

Firstly, the IP set requests an IP Address from the Customer LAN. Once obtained, this is immediately released and queries are made for an IP Address from each VLAN ID in turn, until an address is found on the appropriate VLAN for IP Phones.

Note: This feature is supported on DHCP servers with the Avaya vendor specific IP sets

Supported VLANs

The BCM50 supports 4 VLANs and the BCM450 supports 8 VLANs.

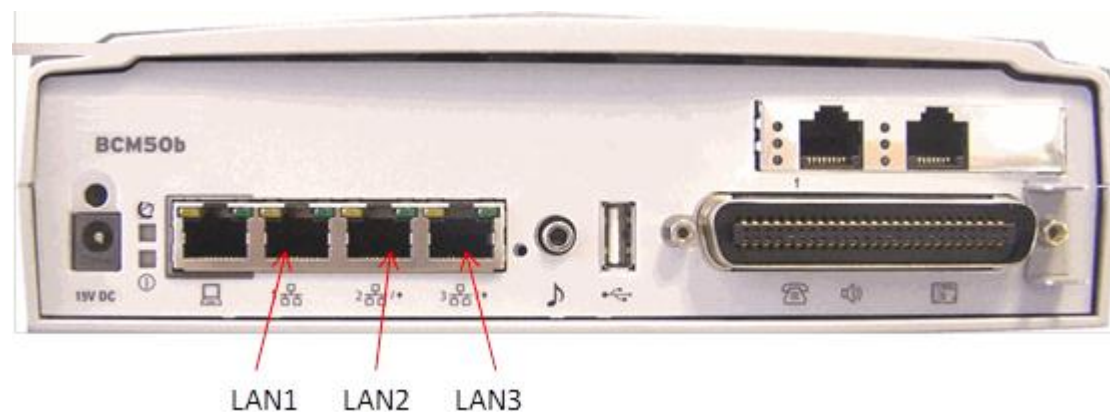
BCM LAN Ports and VLANs

A VLAN can be assigned to either all network ports on the BCM, or just to a single port. This option can be selected when creating the VLANs on the BCM, in the IP Subsystem- VLAN Interfaces configuration area.

Note: VLANs cannot be assigned to the OAM port.

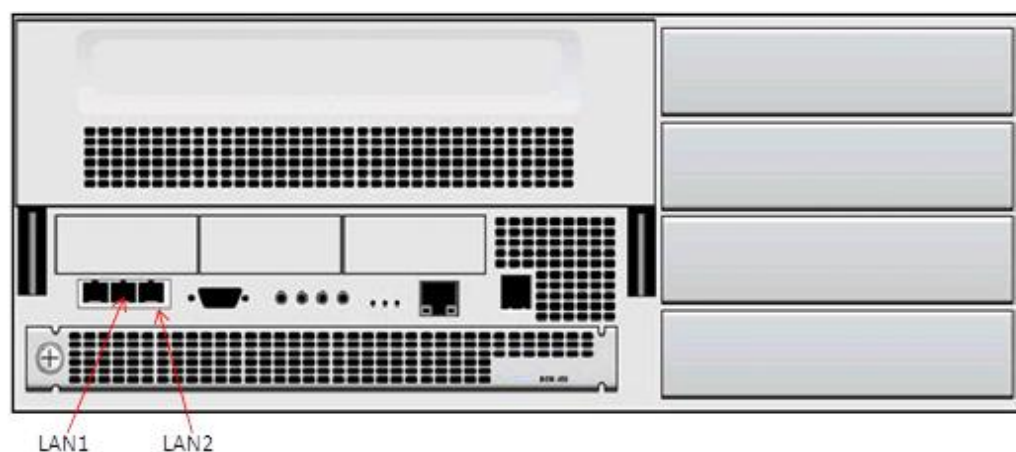
Note: The Customer LAN is unmanaged and can be accessed across all LAN ports.

The BCM50's ports are referenced as below in relation to VLAN assignments:



Note: VLANs cannot be assigned to the ports on the BCM50(b)e or BCM50(b)a integrated router card.

The BCM450's ports are referenced as below in relation to VLAN assignments:

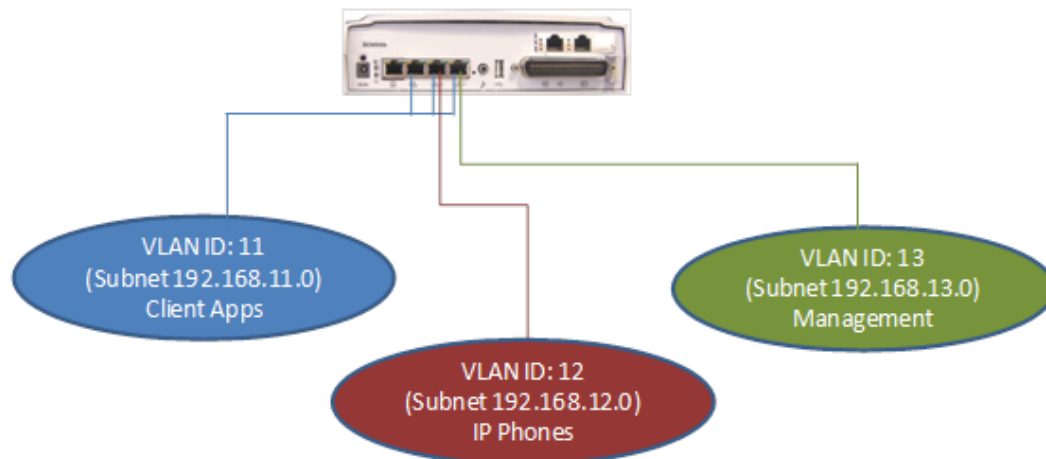


Example VLAN Network Scenario

Below shows how the BCM may be configured to reside in a network configured for VLANs. An example VLAN configuration relating to the BCM could be:

- VLAN ID:11, Subnet 192.168.11.0, used for Client Apps
- VLAN ID:12, Subnet 192.168.12.0, hosting IP Phones
- VLAN ID:13, Subnet 192.168.13.0, for management access

The Customer LAN is unmanaged and accessible on all LAN ports.



This diagram is a logical representation. The attached network equipment must be configured correctly for VLAN working, e.g. LAN 2 above should be connected to VLAN equipment supporting VLAN ID 12.

Required Information

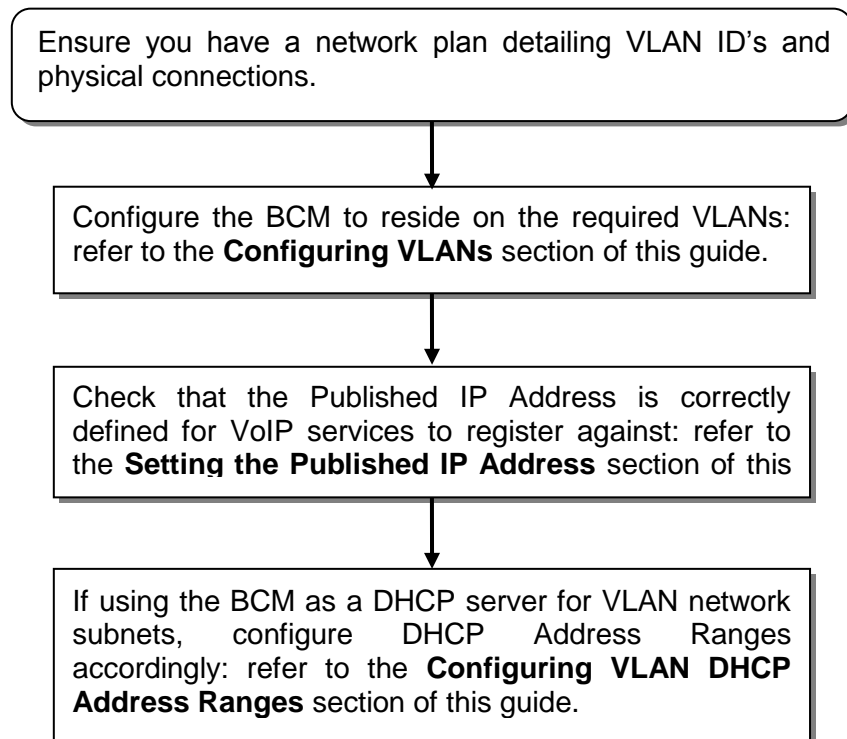
VLAN networking requires careful planning and consideration. The BCM is only one element of a VLAN network, and so BCM configuration should ideally take place after a network plan has been prepared.

With this in mind, ascertain the following information before configuring the BCM for VLAN working:

- The VLAN ID's on the network the BCM will need to reside on.
- The BCM VLAN IP Addresses.
- If the BCM is issuing DHCP addresses on the VLANs (e.g. for IP Phones), you will need DHCP Address Ranges for those VLANs.
- If VLANs are to be configured, which of the BCM's IP Addresses (Customer LAN or VLAN) should be the Published IP Address (for VoIP services to register against etc.)?
- What is the BCM system Default Gateway, and also what are the Default Gateways for the VLAN DHCP Address Ranges (if using DHCP on a VLAN)?

Flow Chart

The flow chart below shows a recommended order for configuring the BCM for VLAN working.



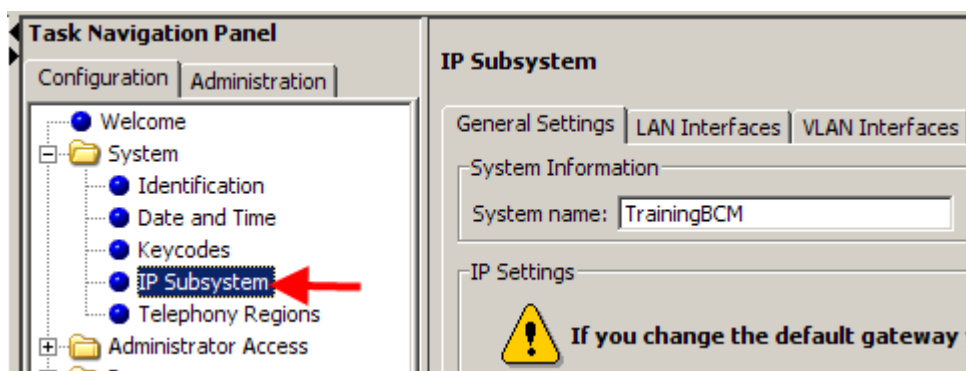
Configuration

When network requirements planning has been performed, and the Customer LAN and VLAN addresses are known, the VLANs can then be created.

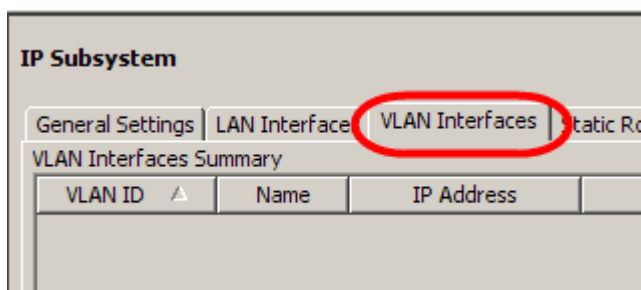
Configuring VLANs

Use the following procedure to create and enter the BCM into a VLAN.

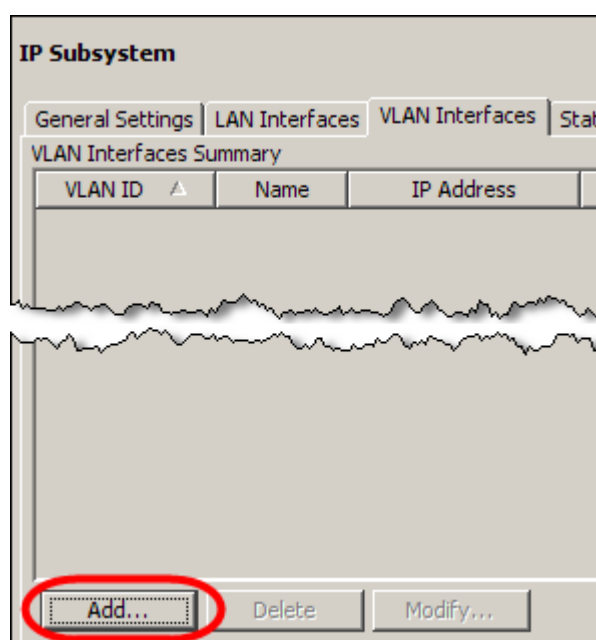
1. In the Element Manager **Configuration** tab, open the **System** folder, and click on the **IP Subsystem** link.



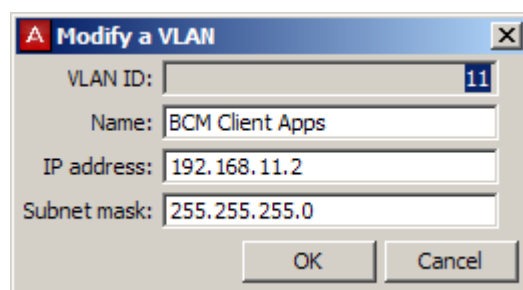
2. Click on the **VLAN Interfaces** tab.



3. To configure the BCM to be part of a VLAN, click on the **Add** button.



4. In the **Add a VLAN** box, enter:
- VLAN ID:** The VLAN ID (range is 1 – 4094).
 - Name:** An identifying name for this VLAN.
 - IP Address:** The IP Address for the BCM in the VLAN subnet.
 - Subnet Mask:** The VLAN subnet mask.



5. The VLAN entry will be added to the list. Repeat as required for as many VLANs as are necessary, up to the maximum supported by the BCM as stated earlier.

The screenshot shows the 'IP Subsystem' configuration window with the 'VLAN Interfaces Summary' table populated. The table has columns for 'VLAN ID', 'Name', 'IP Address', 'Subnet Mask', 'MAC address', and 'P'. The first row is highlighted with a red box.

VLAN ID	Name	IP Address	Subnet Mask	MAC address	P
11	BCM Client Apps	192.168.11.2	255.255.255.0	00:17:65:fa:5a:aa	All
12	IP Phones	192.168.12.2	255.255.255.0	00:17:65:fa:5a:aa	All
13	Data	192.168.13.2	255.255.255.0	00:17:65:fa:5a:aa	All

6. When the VLAN(s) are entered in the list, you should select for each VLAN which ports support that VLAN. The choice is to select one port only, or all ports.

IP Subsystem

General Settings | LAN Interfaces | **VLAN Interfaces** | Static Routes | Dial-Out Static Routes

VLAN Interfaces Summary

VLAN ID	Name	IP Address	Subnet Mask	MAC address	Ports	Allow Network Access
11	BCM Client Apps	192.168.11.2	255.255.255.0	00:17:65:fa:5a:aa	LAN1	<input type="checkbox"/>
12	IP Phones	192.168.12.2	255.255.255.0	00:17:65:fa:5a:aa	All	<input type="checkbox"/>
13	Data	192.168.13.2	255.255.255.0	00:17:65:fa:5a:aa	LAN1 LAN2 LAN3	<input type="checkbox"/>

Note: If you have selected a specific port, ensure that port is physically connected to the network that will allow access to that VLAN.

7. Select whether or not the VLAN should **Allow Network Access**. This option, if enabled, allows traffic on the VLAN destined for other networks to be forwarded from the VLAN.

IP Subsystem

General Settings | LAN Interfaces | **VLAN Interfaces** | Static Routes | Dial-Out Static Routes

VLAN Interfaces Summary

VLAN ID	Name	IP Address	Subnet Mask	MAC address	Ports	Allow Network Access
11	BCM Client Apps	192.168.11.2	255.255.255.0	00:17:65:fa:5a:aa	LAN1	<input checked="" type="checkbox"/>
12	IP Phones	192.168.12.2	255.255.255.0	00:17:65:fa:5a:aa	All	<input type="checkbox"/>
13	Data	192.168.13.2	255.255.255.0	00:17:65:fa:5a:aa	All	<input type="checkbox"/>

Setting the Published IP Address

The Published IP Interface is the IP Address that IP Telephones need to register against as well as the address that VoIP gateways need to be “pointed” towards. You have the choice of selecting the Customer LAN (refer to the **Configuring the LAN IP Address** section of the **System Start Up Guide**) or any VLAN IP Addresses that are configured on the BCM in the IP Subsystem section of Element Manager.

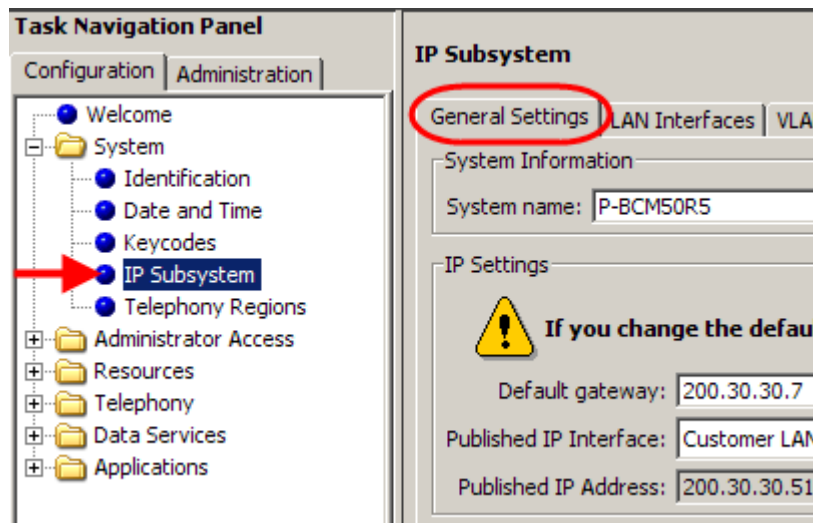
The Published IP Address must be set as the S1 IP (or S2 IP if the BCM will be used as a “backup” registration BCM) when configuring IP phones for registration.

Note: The Published IP Address is the address that LAN CTE should also register against. For further information, refer to the **LAN CTE Guide**.

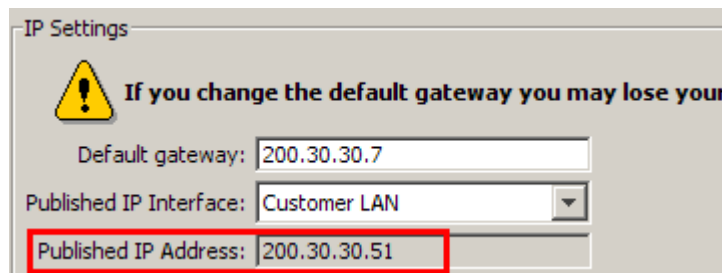
Note: For further information concerning the Published IP Address in relation to VoIP, refer to the **IP Telephony Guide**.

Use the following procedure to check or set the Published IP Address.

1. From the **Configuration** tab, open the **System** folder and select **IP Subsystem**. Click on the **General Settings** tab.



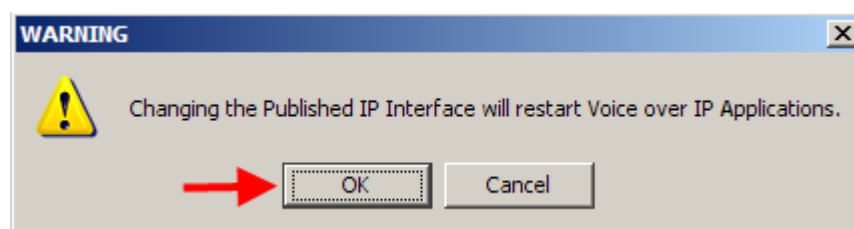
2. If checking the existing **Published IP Address**, view the read-only field.



3. If changing the setting, from the **Published IP Interface** drop-down list, select the Customer LAN or any of the VLANs configured on the BCM.

The screenshot shows the 'IP Subsystem' configuration window with the 'LAN Interfaces' tab selected. Under 'IP Settings', the 'Published IP Interface' dropdown menu is open, displaying a list of options: 'Customer LAN', 'VLAN ID 11: BCM Apps', 'VLAN ID 12: IP Phones', and 'VLAN ID 13: Data'. The 'Customer LAN' option is highlighted. A red rectangle is drawn around the dropdown menu.

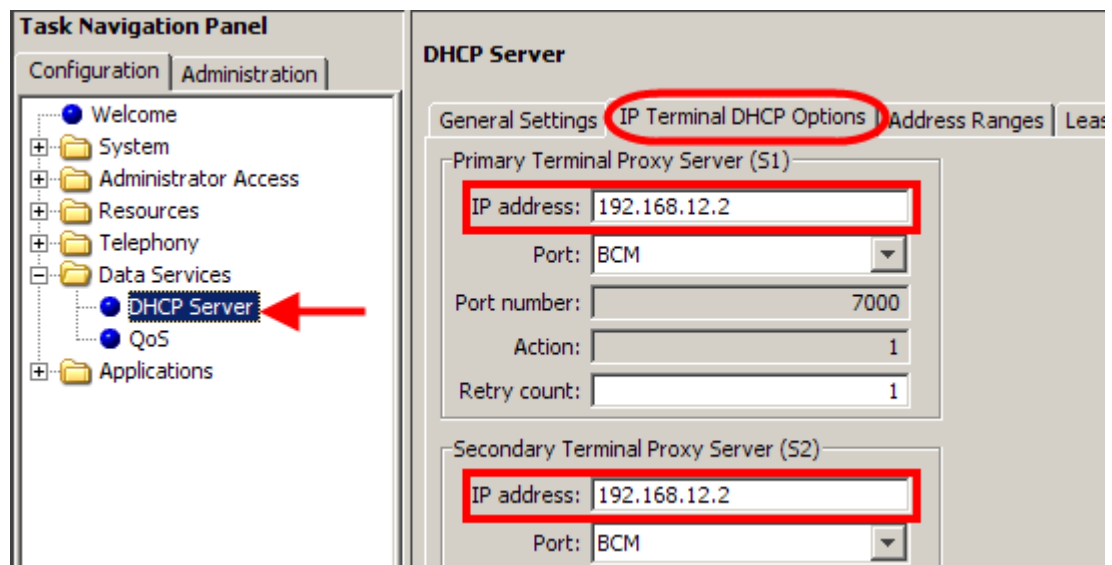
4. A warning box will appear stating that all Voice over IP applications will be restarted. This may result in VoIP calls being dropped. Click **OK** to continue.



5. If changed, the new setting will be displayed,

The screenshot shows the 'IP Subsystem' configuration window with the 'LAN Interfaces' tab selected. Under 'IP Settings', the 'Published IP Interface' dropdown menu now shows 'VLAN ID 12: IP Phones' selected. The 'Published IP Address' field now displays '192.168.12.2'. A red rectangle is drawn around the 'Published IP Address' field.

6. Changing the **Published IP Interface** setting also has the effect of changing the S1 Primary Terminal Proxy Server IP Addresses (S1 & S2) in the DHCP Server IP Terminal DHCP Options screen.



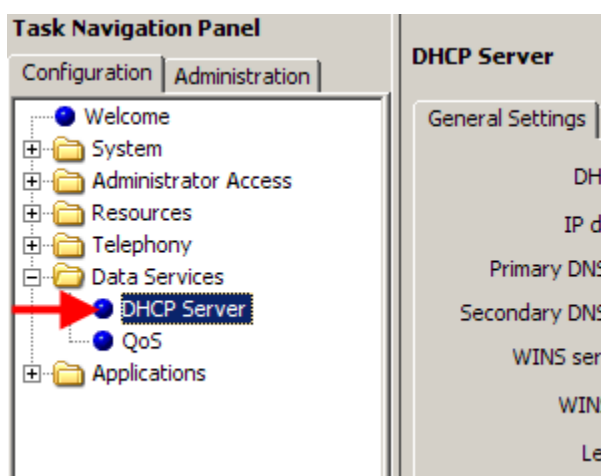
Configuring VLAN DHCP Address Ranges

If VLANs have been configured on the system, it may be necessary to configure an address range relating to that VLAN to issue IP Addresses to DHCP clients on that VLAN. For example, if a VLAN has been created specifically for IP Phones and the BCM is acting as a DHCP server for the IP Phones, it will be necessary to create a range of IP Addresses on the VLAN subnet to issue to IP Phones.

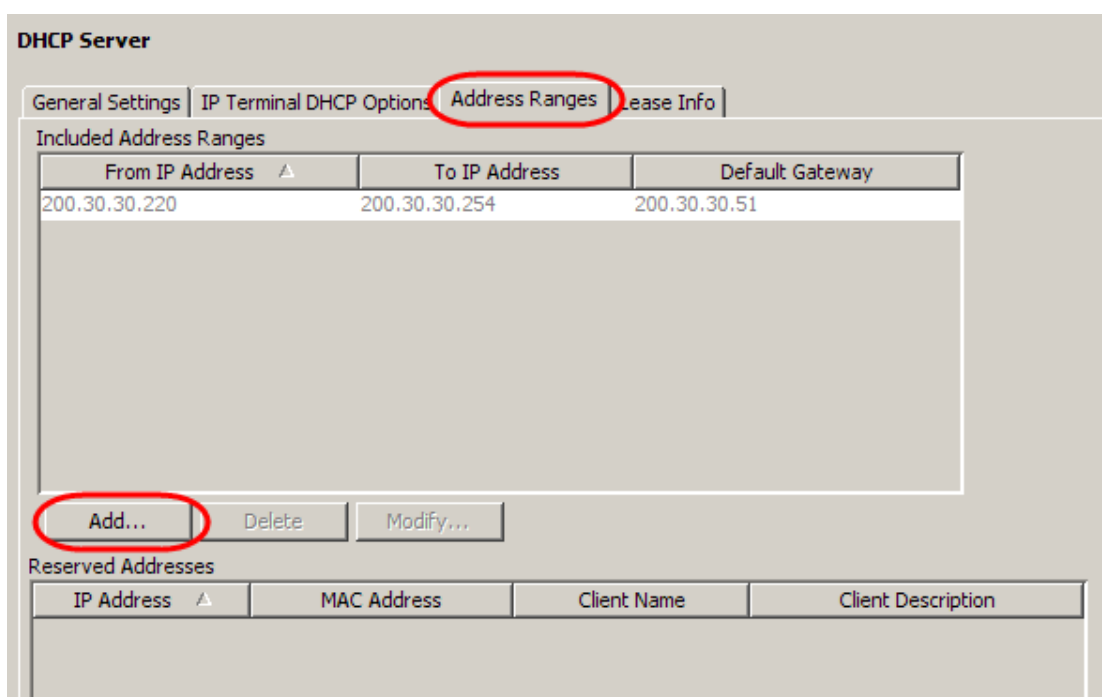
Use the following procedure to set an Address Range.

The IP Addresses to be issued to DHCP clients are entered in this section. If the DHCP mode is set to **Enabled – IP Phones Only** then the Address Range entered here will only relate to IP Phones.

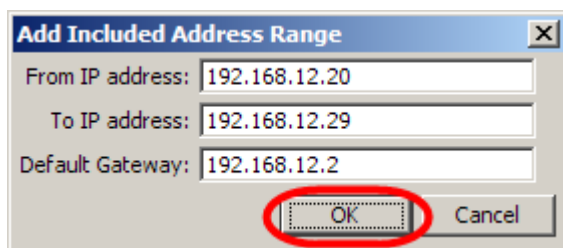
1. In Element Manager, select the **Configuration** tab and open the **Data Services** folder and select **DHCP Server**.



2. Select the **Address Ranges** tab. Click on Add to add a new Address Range. It is possible to configure Address ranges for the Customer LAN IP address and also any VLANs that may be configured. You can also:
 - Click on **Modify** to add a new address range
 - Click on **Delete** to delete a range



3. In this example an address range has been added. Enter the address range and the Default Gateway to be issued to DHCP clients and click **OK**.



Note: If an Address Range is entered that is not compatible with the Customer LAN or VLAN subnets, an **Invalid Parameter** error message will be displayed. The Address Ranges must be compatible with the Customer or VLAN subnets.

Note: Whenever you make changes to the address range, the DHCP server may become unavailable to clients for a brief period of time.

Address Ranges Settings

Attribute	Value	Description
Included Address Ranges		
From IP Address	<IP Address, format 10.10.10.10>	An IP address specifying the lowest IP address in a range.
To IP Address	<IP Address, format 10.10.10.10>	An IP address specifying the highest IP address in a range.
Default gateway	<IP Address, format 10.10.10.10>	The gateway through which DHCP clients connect to an external network.
Add	<button>	Click to add an included address range.
Delete	<button>	Click to delete a selected address range.
Modify	<button>	Click to modify a selected address range.

Additional Information

Configuring Static Routes

It may be necessary to configure a static route to send network traffic to a known destination through a specific router (default gateway). The router must be on the same subnet as a VLAN IP Address, and will be a different router to the BCM system Default Gateway.

Static routes consist of:

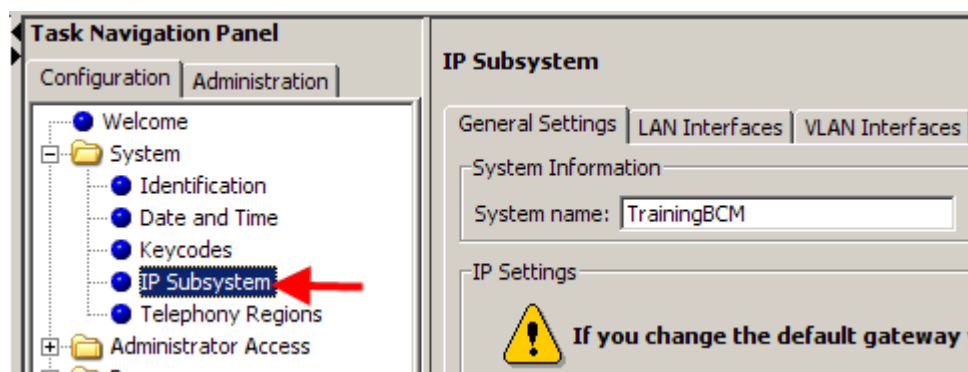
- The destination IP Address & subnet mask.
- The router residing on the BCM's network that network traffic must be sent via to reach the destination.

If the destination IP Address is a known static route, i.e. entered in the Static Routes table, the network traffic will be sent via the specified router. Traffic to all other destinations will be sent via the BCM system Default Gateway.

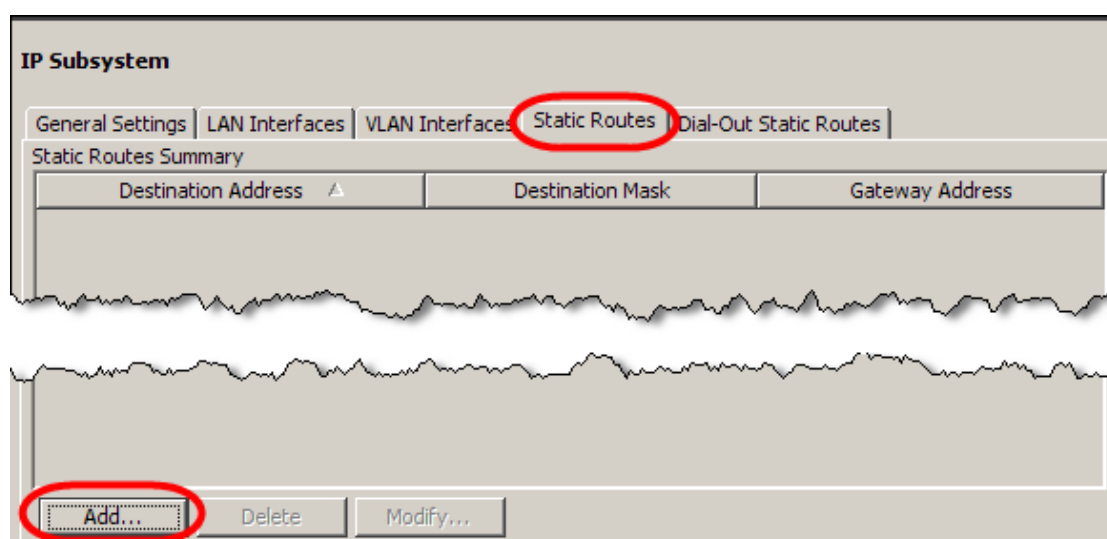
Note: VLAN routed traffic is processed by the BCM CPU. Consider your planning of VLAN routing so that VLAN routed traffic does not overload the BCM processor, particularly in the case of the BCM50 where the processing capability is not as great as the BCM450. You can check the processor usage via BCM Monitor to ensure that the BCM is not overloaded.

If static routes require defining, use the following procedure.

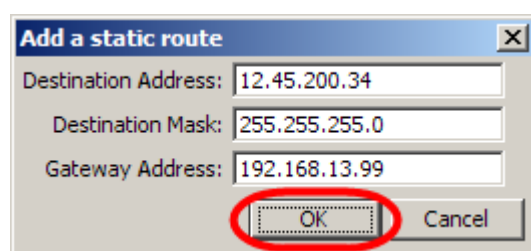
1. In the **Configuration** tab, open the **System** folder and click on the **IP Subsystem** link.



2. Select the **Static Routes** tab and click on the **Add** button.



3. Enter the routing details and required destination.



Avaya Documentation Links

- [Configuration - Telephony](#)

